SALINITY TOLERANCES of Trees and Shrubs

Compiled by: Russell Haas, Plant Materials Specialist, and Craig Stange, Forester, February 27, 1997

Salinity (mmhos/cm)

	Not Saline		Very slightly saline		Slightly saline				Moderately saline							Strongly saline	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**
Plant Species																	
Apricot, Manchurian 6	═	═															
Ash, Green 3	═	═	═	═	═	═	═	═	═	═							
Aspen 1	═	═															
Birch 1	═	═															
Boxelder 1	═	═	═														
Buffaloberry, Silver 1	═	═	═	═	═	═	═	═	═	═	═	═					
Caragana 7	═	═	═	═	═	═	═	═	═	═							
Cherry, Sand 6	═	═															
Chokecherry 7	═	═	═	═	═	═	═										
Cotoneaster 1	═	═															
Cottonwood 1	═	═															
Crabapple, Siberian 1	═	═	═														
Dogwood 1	═	═															
Douglas-fir 1	═	═															
Elm, American 1	═	═	═	═	═	═	═										
Elm, Siberian 1*	═	═	═	═	═	═	═	═									
Fir, Balsam 1	═	═															
Hawthorn 1	═	═	═	═	═	═	═	═									
Juneberry 1	═	═	═	═	═	═	═	═									
Juniper, Spreading 1	═	═	═	═	═	═	═										
Larch, Siberian 5	═	═	═	═	═												
Lilac, Common 1*	═	═	═	═	═	═	═	═									
Lilac, Villosa 1	═	═	═	═	═	═	═										
Linden, Little Leaf 1	═	═															
Mountain-ash 1	═	═	═	═	═												
Pine, Ponderosa 1*	═	═	═	═	═	═	═	═	═								
Pine, Scots 2	═	═	═	═													
American Plum 7	═	═	═	═	═												
Poplar, Hybrid 1*	═	═															
Rose 1	═	═	═														
Russian-olive 4*	═	═	═	═	═	═	═	═	═	═	═	═					
Sea-buckthorn 1	═	═	═	═	═	═	═	═	═	═	═	═	═	═			
Spruce, Colorado Blue 1	═	═	═														
Spruce, White 1	═	═															
Viburnum 1	═	═															
Walnut, Black 1	═	═															
Willow, Laurel 1	═	═	═	═													

Numbers behind each species refer to specific technical references listed on the following page.

* Indicates where specific rating from the listed reference was modified slightly to fit North Dakota experiences. In no case was the listed value increased more than 1.5 mmhos/cm. In several instances the values were reduced by up to 3 mmhos/cm.

Important Considerations

Plant species differ in the stages at which they are most sensitive to salinity. Generally trees are more sensitive to salinity at establishment.

Plant stress related to salinity may be evident at levels lower than those listed. The listed values generally refer to the level at which major portions of a plant population show considerable mortality, reduced biomass, or growth rates.

Plants appear less salt tolerant when grown in a hot, dry climate than a cool, humid climate.

Salinity levels are affected by the soil, the plants, the landscape, the climate and the management of the soil surface. They change from day to day, from season to season and from spot to spot on the field.

Source of salinity affects the choice of management options available.
Saline seeps from local recharge areas are easier to manage than those seeps formed from deep aquifer recharge.

Salinity is usually associated with adequate to surplus moisture and the presence of soluable salts. Sodicity refers to a restrictive soil layer that prohibits root development and causes severe root restrictions in plants.

Management options to minimize the negative aspects of salinity:

Select those species most tolerant to salinity that meet the landowner's objectives.

Manage the soil surface around each plant to minimize soil water evaporation and concentration of salts. Practices such as scalp planting and mulching, with either fabric or organic mulches, are effective in keeping the soil surface moist and discouraging salt accumulation near the young plant.

References

1. McKenzie, R. C., mid 1980's Tolerance of Plants to Soil Salinity, Soil and Water Agronomist, Alberta Special Crops and Horticultural Research Center, Bag Service 200, Brooks, Alberta TOJ OJO.
2. Cram, W. H. Luecken, Soil Salinity Tolerances of Conifers, Can. Soc. For Hort. Sci., Vol. 11 pp 30-32.
3. Excerpt from Prairie Farm Rehabilitation Administration (PFRA) research report measuring green ash response to salinity.
4. Sandoval, Fred M., Leo C. Benz, E. J. George, and R. H. Mickelson, "Microrelief Influences in a Saline Area of Glacial Lake Agassiz On Salinity and Tree Growth", reprinted from Soil Science Society of America Proceedings, Vol. 28, No. 2, March-April 1964, pp 276-280.
5. Carter, M. R., Effects of Sulphate and Chloride Soil Salinity on Growth and Needle Composition of Siberian Larch, Investigations Section, PFRA Tree Nursery, Indian Head, Saskatchewan SOG 2KO.
6. Tanji, Kenneth., Agricultural Salinity Assessment and Management, Water Quality Technical Committee, American Society of Civil Engineers, 345 E. 47th St., New York, N.Y. 10017
7. Tinus, Richard S., Salt Tolerance of Ten Deciduous Shrub and Tree Species, General Technical Report INT-168. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Range and Experiment Station; 1984, 96 pp.